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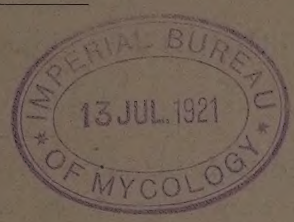
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COMMON DISEASES OF CUCUMBERS AND MELONS X

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AGRICULTURAL EXPERIMENT STATIONS

CIRCULAR 68

COMMON DISEASES OF CUCUMBERS AND MELONS¹

In many sections of New Jersey the growing of cucumbers and melons is an important industry. These plants are all subject to a number of common diseases which are the cause of serious losses. The prevalence of these diseases has led to many inquiries addressed to the Agricultural Experiment Station. For this reason it was deemed advisable to prepare this circular describing the most important of these diseases and giving the approved methods for their control.

Some these diseases produce effects so similar in nature that the grower frequently mistakes one for the other. It is well, therefore, to consider the distinguishing characteristics of the more important ones so that they may not be confused with other diseases not so readily controlled by spraying. Some of these diseases can be controlled by the application of Bordeaux mixture, but success depends, in a large part, on the care taken in the preparation and application of the spray. Where the proper precautions are taken the treatment is usually effective.

DOWNY MILDEW [*Pseudoperonospora cubensis* (B & C.) Rosten.] (fig. 1) is one of the most common and most destructive of the diseases of cucumbers, melons and similar plants. The disease attacks the oldest leaves and works toward the tips of the vines. The leaves first show indefinite yellow spots, which later become angular with definite outline, (fig. 1), and finally the entire leaf dries up. Affected vines may continue to grow at the tip, but the disease follows the new growth. A vine of this kind will produce numerous blossoms, but will set very little fruit. In many cases the fruit does not mature, and if it does mature it is inferior in quality and has little market value. The progress of the disease is favored by cloudy, humid weather.

¹Prepared April 4, 1917, by W. H. Martin, B.A., assistant in the Department of Plant Pathology.

This disease can be controlled by spraying with Bordeaux mixture. Spraying should be begun early, as it is almost impossible to check *downy mildew* when it becomes established in a field. Best results should follow when the spray is applied at about the time the vines begin to run. In spraying, care should be taken to cover both the lower and upper leaf surfaces with a film of the mixture for there is reason to believe that lack of success in the control of this disease by spraying can be traced directly to the fact that the lower leaf surface was not sprayed.



Fig. 1.—Downy mildew of the cucumber.

For the first several treatments, the 2-4-50 formula (2 pounds of copper sulfate, 4 pounds of lime to 50 gallons of water) may be used. It is advisable to use a weak solution for the first application in order not to injure the young plants. For later treatments, when the plants have formed runners, the 4-4-50 formula may be used. In this connection, it is important to remember that improperly prepared Bordeaux mixture may injure the foliage. Complete directions for the preparation of Bordeaux mixture are to be found in Circular 48 of this Station.

The intervals between the applications are to be governed by weather conditions. In dry weather every week or 10 days should be sufficient; in wet weather, the applications should be made more frequently. The final aim should be to keep both leaf surfaces covered with a film of the mixture. Best results usually follow if the spray is applied as a fine mist at the rate of 100 gallons to an acre. However, the amount used cannot be fixed, as this depends entirely on the age and size of the plants.

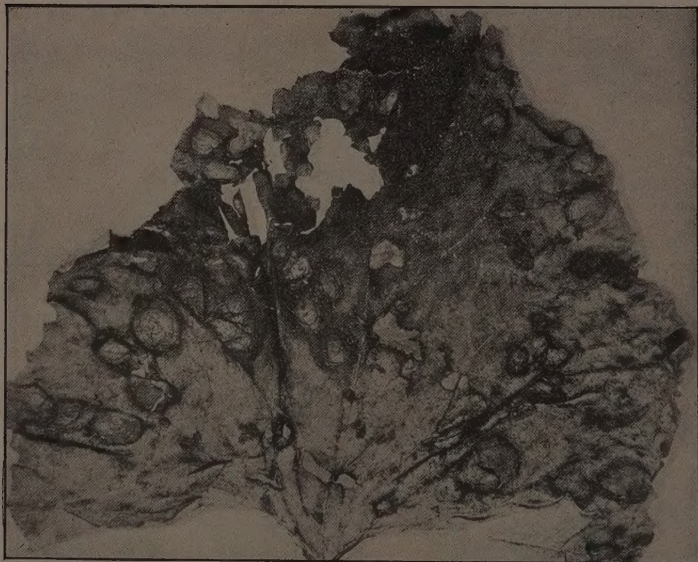


Fig. 2.—Leaf blight of the cantaloupe.

LEAF BLIGHT [*Alternaria brassicae* var. *nigrescens* (Pegl.)] (fig. 2) is less destructive than *downy mildew* and is often associated with it. It is a common disease of muskmelons, and frequently occurs on cucumbers. Leaf blight begins as small, circular spots which, in the later stages, show concentric rings (fig. 2). These spots enlarge and frequently coalesce, forming brown areas that may cover a large part of the leaf surface. The injury from blight results in early death of the leaves, as a result of which the yield of fruit is greatly reduced. It also tends to hasten the ripening process, thus greatly injuring the quality of the fruit.

As the disease seems most serious in fields that have been repeatedly planted in melons, it is believed that the organism causing

it lives from one season to another in the old vines and in the soil. For this reason it may be well to remove and burn the dead vines and to practice crop rotation. Leaf blight can be controlled by spraying with Bordeaux mixture. The treatment employed in the control of *downy mildew* is effective in controlling *leaf blight*.

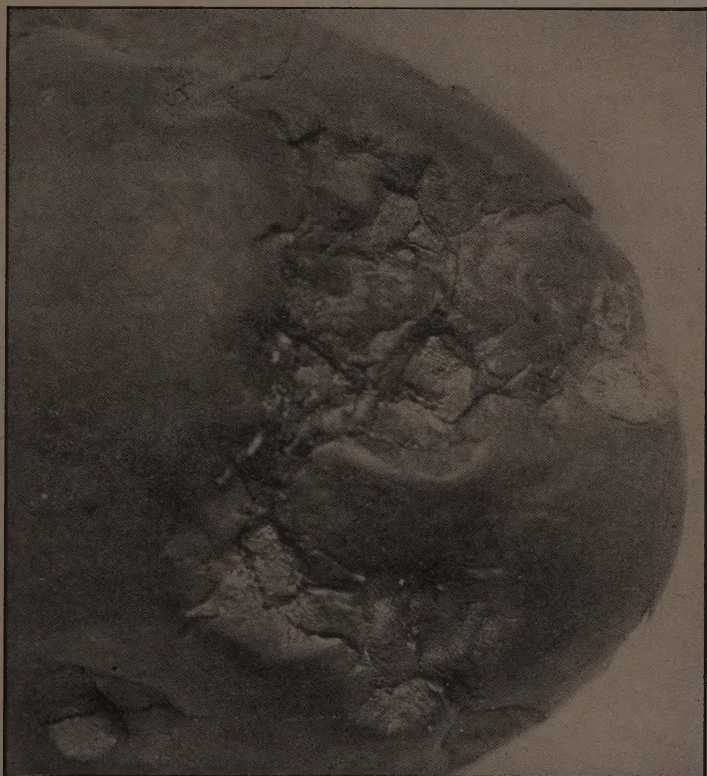


Fig. 3.—Anthracnose of the watermelon.

ANTHRACNOSE [*Colletotrichum lagenarium* (Pass.) Ell. & Hals.] (fig. 3) is widespread throughout the state and does more damage than is at first apparent. It is very common on watermelons and cucumbers and also attacks muskmelons.

The disease attacks leaves, stems and fruit. On the leaf, small, circular dead areas are formed; these gradually increase in size and frequently occupy a large part of the leaf area. On the stem, elon-

gated spots are formed; these become shrunken and frequently result in the death of the branch. On the fruit, especially on the watermelon, this disease does its greatest damage. Sunken spots are formed which usually have a dark border and are covered with a mass of pink spores. The spots vary greatly in size, sometimes becoming 2 inches in diameter (fig. 3). This disease produces conditions favorable for attack by rot organisms, as a result of which the melons may decay on the vine.

The organism causing this disease is similar to the one causing *anthracnose* of the bean and grape and *bitter rot* of apple. The disease may be checked by spraying with Bordeaux mixture, the methods of treatment being the same as those recommended for *downy mildew*. It may be well to burn all dead vines and to practice crop rotation.

WILT [*Fusarium vasinfectum* (Atk.) Smith] is a very serious disease of watermelons in the southern and western states. It has appeared in some parts of South Jersey, but has not been extensive. It is caused by a fungus which lives in the soil and gains entrance to the plant through the roots. The fungus threads of the parasite are to be found most abundantly in the water-carrying vessels, plugging them up and preventing the rise of water, thus causing the plant to wilt and soon die. On cutting the root across at the surface of the ground a darkening of the woody tissues will be observed. This coloration, together with the wilting of the plant, makes the identification of the disease easily possible.

The disease is spread in a number of ways: (1) by the wind blowing particles of earth in which spores are carried, (2) by the farm implements in cultivation or by the feet of men or work animals passing from one field to another, (3) by the fungus overwintering in the old vines—frequently these are thrown in the barnyard and from here are carried out to infect other fields.

Spraying will not help in the control of this disease, therefore, its introduction must be prevented. This may be done by observing the following precautions.

1. Watermelons should never be planted on land where watermelons have been grown within 10 years, if the wilt was serious in the previous crop.

2. Stable manure infected with the fungus by the use of refuse containing melon vines should never be applied to land where it is desired to plant watermelons. Diseased vines should be burned so that they may not serve as a source of infection.

SCAB or MOULD (*Cladosporium cucumerinum* Ell. & Arth.) has been reported on melons a number of times from New Jersey, but is not severe. It makes its appearance during moist weather and under favorable conditions may do considerable damage. It occurs on the fruits, where it produces sunken spots and may also be found on the stems and leaves. Control measures have not been fully determined, but the regular spray treatment employed in the control of *downy mildew* should do much to keep the disease in check in case it becomes serious.

POWDERY MILDEW (*Erysiphe polygoni* B. C.) is an uncommon disease in New Jersey and is rarely serious. It may be distinguished from the *downy mildew* in that, unlike the former, it does not produce definite spots. It appears as a whitish growth on the older leaves and does not usually extend over large areas. Excessive moisture and poor ventilation afford favorable conditions for the development of the disease, so that it is much more common on greenhouse plants. When this disease appears in the greenhouse, these two conditions should be corrected. Flowers of sulfur in the form of a paste, applied to the hot water pipes, may be used as a control.

LEAF SPOT (*Cercospora citrullina* Cooke). This fungus attacks the leaves of watermelons, but while it has been reported from this state, it is by no means common. The spots are small, black, nearly circular in outline with grayish centers. They first appear on the leaves at the center of the plant. This is one of the minor diseases and may be checked by spraying with Bordeaux mixture as employed in the treatment of *downy mildew* and *leaf blight*.

LEAF BLIGHT (*Cercospora cucurbitae* Ell. & Erw.). This leaf blight is rare in New Jersey. The spots formed are very similar to those of the common *leaf blight*, previously described. It may be distinguished from the latter by the fact that the spots are usually of a lighter brown color and slightly more angular in form. This leaf blight, like the more important one, may be controlled by spraying with Bordeaux mixture.

WILT OF CURCUBITS (*Bacillus trachiphilus* Erw. Smith) (fig. 4) is a serious bacterial disease of cucumbers, melons and cantaloupes. Injury to the plant results from a clogging of the water vessels by the organism. It differs from the disease previously described in that no definite spots are formed, it being characterized by a progressive wilting of the entire plant (fig. 4).

The organism causing *wilt* is carried by insects, and the spread of the disease depends largely on the number and kinds of insects pres-

ent.² Since this is true, it is necessary to control the insects in order to prevent the disease. Spraying with Bordeaux mixture will not control this disease as it will the leaf diseases, but the presence of the spray on the leaves acts to some extent as a repellant to insects, so that in spraying for the leaf diseases, much will be accomplished toward keeping this disease in check. *Wilt* disease may be partially controlled by adding 2 pounds of lead arsenate to each 50 gallons of Bordeaux mixture applied. The combined insecticidal



Fig. 4.—Bacterial wilt.

(By courtesy of the U. S. Bureau of Plant Industry)

properties of the former and the bacterial action of the latter have proved to be very effective. Success depends, however, in a large part, on the time of application. If the first treatment is made just as the true leaves have formed, followed by treatments every week or ten days, good results should be obtained. For the first treatments the 2-2-50 formula, to which 2 pounds of lead arsenate to 50 gallons of this mixture have been added, may be used. For later treatments the stronger mixture (4-4-50) may be employed.

ANGULAR LEAF SPOT (*Bacterium lachrymans* Erw. Smith) is another cucumber disease of bacterial origin. It has not been reported from New Jersey, but is found in many of the eastern states.

²The Striped Cucumber Beetle (*Diabrotica vittata* Fan.) and the Twelve Spotted Cucumber Beetle (*D. dudodecimpunctata* L.) have both been shown to be carriers of this disease.

The disease is characterized by the formation of angular, dry, brown spots, which by dropping out give the leaves a ragged appearance. Frequently, in the early stages of the disease, drops of moisture are given off from the lower surface of the spots; these dry and leave a whitish deposit in the leaf. The disease may also attack young stems and petioles, causing them to become water-soaked and to break or crack open.

Satisfactory control measures have not been worked out for this disease, but laboratory tests indicate that Bordeaux mixture should be of value as a control.

DAMPING OFF (*Pythium de Baryanum* Hesse) is a fungus disease which attacks cucumber seedlings grown under glass, and under conditions favorable to its development, may prove very destructive. The disease attacks the young plants at a point near the surface of the soil. The tissues in the affected region become shrunk and the plant collapses. The fungus may then spread through the entire plant, especially if there is excessive moisture present. Any condition which tends to produce weak seedlings may lay the plant open to attack. The fungus is especially favored by an excess of moisture in the soil, lack of ventilation and sunlight. In the greenhouse *damping off* can be prevented by sterilizing the soil, by heating it to a temperature of 140° F. or by treatment with formaldehyde. This disease can be controlled also by reducing the soil-moisture content, by proper ventilation and by giving the seedlings plenty of sunlight.

STEM ROT (*Sclerotinia libertiana* Fckl.) is rare on field-grown cucumbers. In some states it has been reported as a serious disease of greenhouse cucumbers. It attacks the stem near the surface of the soil, causing a water-soaked appearance, and finally the plant collapses. A white mold makes its appearance on the stem and very frequently small black sclerotia are formed; these first appear as small white bodies, then finally turn black. In case of a severe attack it may be necessary to sterilize the soil in the greenhouse before healthy plants can be grown. Where this is thoroughly done it constitutes a certain remedy for this and other fungus diseases having their origin in the soil.

CUCUMBER MOSAIC (White Pickle, Little Pickle) (Cause undetermined) (fig. 5) is not a common disease in New Jersey, but in some sections of the country it has become serious. It is only in recent years that it has been reported on field-grown cucumbers, but

the range of its extent is so great that it may be expected to become serious in this state at any time.

The disease may effect the entire plant-stem, leaves and fruit. On the fruits, the first indication is a yellowish mottling near the stem end. Later the entire fruit may appear pale yellowish-green either with or without mottlings of darker green, and typically they are covered with larger or smaller swellings or warts which are green in

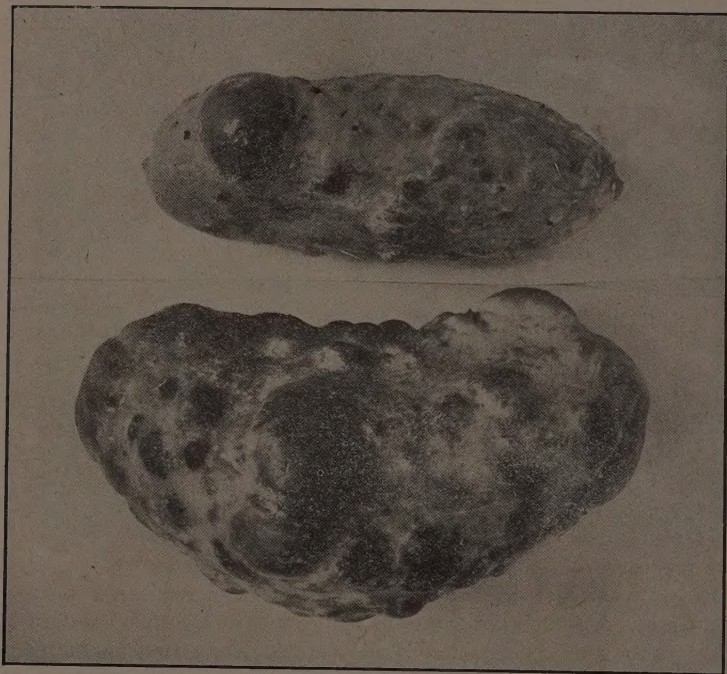


Fig. 5.—Mosaic of cucumber.

(By courtesy of the U. S. Bureau of Plant Industry)

color. Some of the fruits may become darker green than is normally the case and are often much distorted and misshapen (fig. 5). On the leaf the first indication of the disease may be a slight mottling, or a differentiation into yellowish and dark green areas. At this stage, the leaf presents a wrinkled appearance, due, no doubt, to unequal tissue expansion, the healthy areas developing more rapidly than the yellow ones. This wrinkling is very characteristic of the disease and is similar in appearance to the effect produced on

the tomato leaf by *mosaic*. Plants affected with *mosaic* seldom attain full size, often blossom sparingly and set little fruit.

The exact nature of *mosaic* is unknown, but it is known to be highly infectious. It is readily transmitted by insects and will pass from diseased to healthy vines by contact. In cultivation also, the disease may be carried from one plant to another on the implements. If an affected plant is observed, it is well to remove and destroy it at once. In removing a diseased plant from the field it should not be allowed to come in contact with healthy vines. Satisfactory methods of control have not been found; the only thing to be done is to prevent, as far as possible, the spread of the disease from one plant to another.

SUMMARY

Diseases Controlled by Spraying

The following diseases of cucumbers, melons, squash and allied plants may be partially controlled by spraying with Bordeaux mixture: *downy mildew*, *leaf blight*, *leaf spot*, *anthracnose* and *scab*.

There is evidence showing that bacterial wilt may be partially controlled by spraying with Bordeaux mixture plus 2 pounds of arsenate of lead to 50 gallons. This disease, however, will not be as fully controlled by spraying as the leaf blights.

The first spray should be applied at about the time the vines form runners.

Strong mixtures should not be used on young plants.

Improperly prepared Bordeaux mixture may injure the foliage of young plants. (For making Bordeaux mixture see Circular 48, N. J. Agr. Exp. Sta.)

Best results will follow if applications are made every week or 10 days. In dry weather every 10 days should be sufficient. In wet weather, or if there is blight in neighboring fields, the spraying should be repeated weekly.

The final aim should be to keep both the upper and lower leaf surfaces protected with a covering of Bordeaux mixture.

The spray should be applied at the rate of 100 gallons per acre on mature plants. A pressure of 150 pounds per square inch is desirable.

Diseases not Controlled by Spraying

Powdery mildew, *stem rot*, *fusarium wilt*, *damping off* and *mosaic* cannot be controlled by spraying.

